BIG LOST RIVER 208 WATER QUALITY IMPROVEMENT PROJECT

BLM 208 IMPLEMENTATION PLAN

MACKAY PLANNING UNIT

BLM SALMON DISTRICT

SALMON, IDAHO 83467

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BLM 208 Implementation Plan
Mackay Planning Unit
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I. Introduction

The Big Lost River 208 Water Quality Improvement Project is located in the Mackay Planning Unit in Custer County in east-central Idaho. The project is located along a 30 mile section of river extending from Mackay Reservoir through the BLM Mackay Planning Unit to the Challis National Forest Boundary. This section of river flows through private, state and federal lands. The upper third of the project area is managed by the BLM.

Excessive riverbank erosion along the Big Lost River is the major problem contributing to the economic loss of valueable agricultural land, degradation of water quality in the river and sedimentation of fisheries habitat and the storage capacity of Mackay Reservoir, a vital multiple use water resource structure which supports irrigation for nearly 400 water users in the lower Big Lost River Valley.

The Big Lost River 208 Assessment Program is based on a strategy designed to satisfy the goals outlined in Sections 208 and 304 of the original Clean Water Act of 1972, Public Law 92-500. The assessment procedure objectives are to:

1. Develop a method to identify the problems and causes of erosion and sedimentation along the Big Lost River and the Mackay Reservoir.

2. Identify the land use and water use conflicts arising from riparian zone management along the river corridor and in the watershed.

3. Select and implement effective corrective strategies or "Best Management Practices" to be applied by riparian land managers in order to protect and maintain the existing land uses and enhance the quality of the water in the Big Lost River and Mackay Reservoir.

The 208 project emphasises the erosional non-point source water quality problems which include:

- erosion
- sedimentation (impacts of deposition)
- excessive organic debris accumulations

Each of these non-point source problems can interfere with beneficial uses of land and water through the natural erosional, transportational and depositional pathways in the hydrologic cycle. The problems can be of natural geomorphologic origin or be man-caused and can vary in terms of nature and severity within a given area with the quantity, quality, timing and location of water. More than one non-point problem may exist at a single location at any one time. Problems can be permanent, seasonal or periodic depending upon the variable sources of precipitation and runoff and can occur in perennial, intermittent or ephemeral types of water.

The goal of the 208 project is to implement the "Best Management Practices" in a coordinated and timely manner to reduce the erosional non-point source problems and the loss of land and protect and increase the quality of the water resources. To achieve this goal, the coordinating agency, the Butte Soil Conservation District, has successfully:

1. Developed a workable, coordinated plan and implementation schedule to protect the river and the watershed and improve the water quality of the Big Lost River and Mackay Reservoir.

2. Increased the planning coordination between the Private Landowners and the Bureau of Land Management, National Forest Service, Idaho Fish and Game, Idaho Department of Water Resources, Soil Conservation Service and the Butte Soil Conservation District and numerous other agencies and affected or concerned parties.

3. Evaluated range management, erosion, water quality, hydrology watershed management, soils, vegetation, fisheries, wildlife, economic and social, scenic and recreational, historic and archaeological resources for environmental assessment purposes.

4. Worked with the Bureau of Land Management and the U.S. National Forest Service to develop and implement "Best Management Practices", and riparian zone management plans for each responsible party or agency.

5. Developed, designed and installed structural and nonstructural "Best Management Practices" to demonstrate their effectiveness in controlling riverbank erosion and improving water quality and fisheries habitat.

6. Established an ongoing research program to evaluate the effectiveness of various plant materials for revegetation purposes and monitor the effects of stream discharge, natural geomorphologic change and land use on erosion, deposition and sediment transport in the Big Lost River.

Public participation in the project has been outstanding and an exceptional rapport has been established between the media, the Soil Conservation District, the private landowners and the many federal, state, county and local government agencies and private interest groups such as the Boy Scouts of America, Trout Unlimited and the Idaho Conservation League. Public interest and involvement in the project has been very active and helpful. Numerous meetings, tours and work days have been held and were well attended over the past two years. The highlight of these activities was the 208 Presentation to Governor John Evans on May 21, 1981. The Governor endorsed the project and happily supported the effort.

II. Organization of the Assessment

The Big Lost River 208 Water Quality Improvement Project uses a multi-agency, interdisciplinary approach to identify the specific non-point source water quality problems and develop feasible solutions. A systematic, reproducible procedure has been developed and applied to evaluate:

- areas where non-point problems exist and either threaten or impact the existing beneficial uses;
- areas where potential problems should be carefully managed;
- areas where no recognized problems are known or are likely to occur;
- areas where information is insufficient to assess non-point source problems;
- areas where site specific non-point source control activities have been developed and implemented;
- the development of an area-wide priority system for non-point source water quality management.

In order to achieve the assessment objectives, the project relies on the inputs of various technical disciplines and agencies. Sources of information include existing topographic, geologic and soils maps,

publications, reports, aerial photos and the experiences and memories of local riparian landowners and residents.

Specially designed water resource inventories provide quantitative information concerning the channel stability of the mainstem river banks and stream channels in the upper watershed, reservoir sedimentation, erosional and depositional features, river hydrology and sedimentation characteristics.

The results of the entire assessment procedure are then combined, generalized and presented on a single "3-Step Matrix" which describes the collective condition and knowledge of nonpoint source water quality problems, conflicts and corrective strategies (BMP's).

III. Conceptual Approach to the Development of the 208 Plan

A. Procedure and Evaluation

Non-point source water quality problems and conflicts are identified by determining where conditions exceed the chemical, biological and physical threshholds required to maintain the beneficial uses of water. A no problem situation exists when conditions are acceptable to the beneficial uses or when there are no beneficial uses to protect.

The non-point source assessment procedure uses the sum total of available scientific and human social information and data to classify the non-point source water quality problems according to the following categories:

1. The problem is occuring in the location(s), severity and cause(s) are known and reasonable control measure(s) (BMP's) can be identified.
2. The problem is occuring in the water body, but more information is needed to define the location(s), severity, cause(s) and solution(s).
3. It is not known whether the problem is occuring in the water body and more information is needed to define the location(s), severity, cause(s) and solution(s).
4. The problem is not occuring in the water body.

Each composite categorization carries its own implications. In case 1, the nature, severity, location(s) and cause(s) has been identified and a corrective strategy with alternatives can be developed, evaluated and implemented. In case 2, there is reason to suspect that a problem exists but additional inventory data is required to define the nature, severity, location(s), cause(s) and solution(s). In case 3, there is insufficient evidence or information regarding the status of the problem and, as in case 2, additional information is required to reach a valid conclusion. In both cases 2 and 3, inventory data requirements are immediately defined and prioritized to assure the timely completion of the overall assessment. In case 4, there is no non-point source problem and the land use and conservation practices are consistent with good water quality and, hence, nothing needs to be done.

Public involvement with the assessment procedure occurs when the riparian landowners jointly arrive at conclusions concerning the problems, conflicts and corrective strategies with the government project personnel. Interviews are conducted in the field and in the office with each and every riparian landowner in the project area.

The assessment is completed when each non-point source water quality problem, for each management unit of water, is classified in either:

CATEGORY 1	or	CATEGORY 4
Problem Identified Corrective Strategy Defined		No Problem

B. Development of Prioritizing System

The final step in the assessment procedure is to identify, evaluate and prioritize non-point source water quality management activities, practices and control programs. In every case, this can only be done by comprehensively considering the type of water resources affected, the location and number of people and types of land affected, the land uses, beneficial uses, public concerns, outside interests, political and economic pressures, etc.

In areas where non-point source water quality problems have been identified and threaten or impair present and/or future beneficial uses, corrective strategies will tend to be rehabilitative in nature. The chosen action may be structural or non-structural depending on the nature, location, severity and cause of the problem.

In areas where potential problems will need to be carefully managed, preventive corrective strategies should be applied to all future management actions to prevent an increase in the severity of non-point source problems. This will primarily involve a detailed consideration to the location, design, construction or operation and maintenance of the proposed management action and alternatives.

In areas where no significant problems are known or likely to occur, monitoring should be conducted at time intervals which ensure that nonpoint source conditions do not change. These areas should be clearly identified, acknowledged and protected because of their "natural" character. They can be incredibly useful for "baseline" type comparison studies to other more severely impacted areas.

In areas where existing information is insufficient to assess nonpoint source problems, inventory and monitoring plans and programs should be developed and implemented. Funding requirements can be defined using the objectives of the assessment to guide the water resource scientist in the development of reasonably detailed and comprehensive study proposals.

Finally, in areas where site specific non-point source control programs have been developed and implemented, a review and reevaluation should be conducted to determine the effectiveness of the actions and need for improvements or modifications. This can have a very significant beneficial effect on the success of non-point source control programs implemented on known problem sites.

The results of the entire assessment procedures are combined, generalized and presented on a "3-Step Matrix" which describes the nature, condition and collective knowledge of all nonpoint source water quality problems, conflicts and corrective strategies. The "3-Step Matrix" is used to select problem sites and strategies for a workable implementation plan and schedule for water quality improvement activities.

IV. 208 Implementation Plan for BLM

A. Overview Summary

The 208 assessment identified 18 specific problem sites on BLM land along the river between river miles 29.70 and 10.34. Each of the sites, the land use conflicts, recommended corrective strategy and priority is described and presented in Figure 1, the Planning Matrix of BLM Problem Sites.

There are 16 large bank failure sites, 7 sites with severe bank cutting and 1 site with log jams. The beneficial uses of land and water impacted water quality of river baseflows by erosion include access roads at 3 sites, 1 bridge (owned by private landowner), the county road at 1 site, 3 irrigation ditches, 6 irrigation diversions, 1 privately owned pasture and unimproved and improved rangeland at 10 sites.

FIGURE 1, BLM PLANNING MATRIX FOR BIG LOST RIVER 208 PROJECT

RIVER MILE	PHOTO NO.	SITE NO.	STEP 1 NONPOINT SOURCE PROBLEM TYPE	STEP 2 BENEFICIAL USE CONFLICT		STEP 3 BMP PRIORTIZED ALTERNATIVES 1	2	3	4	5	PRIORITY
29.70	105	1	LBF	CR	URg	REV	MON				LOW
27.17	097	6	C	IH		RR	LOD	REV			LOW
20.90	085	29	LBF,C	ID		MON					LOW
20.46	085	31	LBF	URg		REV	GABION	MON			HIGH
20.13	085	34	LBF	URg	Bitton's B	GABION	REV				HIGH
19.91 to 19.69	083	37	3LBF	Rg Riparian	Bitton's B	REV	MON	GABION			HIGH
19.69	083	38	C	Rip Zone	(Bitton's)	GABION	LOD				HIGH
17.49	079	57	LBF	IRg	AR	GABION	REV	MON			HIGH
17.27	079	61	LBF	IRg	AR	REV	MON	GABION			LOW
16.94	079	63	LBF,C	Rg	AR	REV	MON	GABION			MODERATE
16.61	079	66	LBF, LJ	IH	Rg	GABION	REV	LJ Remove			HIGH
15.40	077	74	LBF	IRg	2IH	GABION	REV				HIGH
15.07	075	78	LBF	URg	ID	MON	GRP	GABION	RR		LOW
15.07 to 14.63	075	79	7C	URg		MON					LOW
14.63	075	80	LBF	URg	IH	DIKE	GRP	GABION	RR		MODERATE
14.41	075	81	LBF	Rip Zone		GABION	RR				MODERATE
13.64 to 12.87	066	84	23C	P, ID	Rg	CA	GM	DIKE	CM	USGS EVAL	HIGH
12.43 to 10.34	066 to 061	85	C-SEVERE	IH	URg	CA	GM	DIKE	CM	USGS EVAL	HIGH

LEGEND

Nonpoint Source Problem Type
- BF - bank failure
- C - bank cut
- LBF - large bank failure
- LJ - log jam

Beneficial Use Conflicts
- AR - access road
- B - bridge
- BLDG - buildings
- CR - county road
- H - hayland
- ID - irrigation ditch
- IH - irrigation heading
- IRg - improved range
- P - pasture
- RIP - Riparian zone
- Rg - range
- URg - unimproved range
- URgRip Zone - unimproved range riparian zone

Corrective Strategy
- CA - channel alteration
- CM - control meander
- GM - gravel manipulation
- GRP - gravel removal placement
- LJ - log jam
- LOD - large organic debris
- MON - Monitor
- REV - Revegetation
- DIKE - Dike

"Best Management Practices" to be applied as corrective strategies include:

1. no action with annual monitoring
2. revegetation with suitable plant species
3. large organic debris placement
4. log jam removal
5. gabion construction
6. rip rap
7. stream channel alteration through gravel removal and replacement

All structural measures are to be combined with nonstructural, revegetation stabilization techniques, to ensure the long term effectiveness of the actions.

Engineering surveys of each of the problem sites identified in Figure 1 have been completed by Johnston and Couch Surveyors, Inc. of Salmon, Idaho, under contract to the BLM. Cross sectional and longitudinal profiles have been drafted and can be used to develop final construction plans for riverbank stabilization structures on a priority basis, as funding is available.

The U.S. Geological Survey and the Bureau of Land Management have cooperatively completed a quantitative study of the hydrology, erosion, channel change and sediment transport of the Big Lost River in support of the 208 Project Assessment. This report will be published by the USGS as a Water Supply Paper.

B. Activity Plan

The 208 Implementation Plan for the correction of the problems identified on BLM land consists of 4 major efforts to be initiated in 1982. These are:

1. Construction of structural river bank stabilization projects at selected high priority sites.
2. Application of nonstructural methods of stabilization at selected priority sites.
3. Annual monitoring water resource inventory and continuing environmental studies.
4. Multiple resource management of BLM lands in and adjacent to the river corridor.

The implementation of this program hinges entirely on the availability of funds in the Fiscal Year 82 budget and on the allocation of funds in years henceforth. Each of these efforts is described in detail below.

1. Structural Riverbank Stabilization Projects

   Gabion riverbank stabilization projects have been demonstrated by the 208 Project as being a particularly effective and highly suitable method for controlling erosion on large bank failures and at cutting banks along the river. Projects of this nature are needed at Sites 34,38, 57, 66 and 74. As funding becomes available, BLM will design and install structures at each of these locations. Sites 34 and 38 are high priority sites because of the erosion hazard threatening Clint Bittons Bridge across the Big Lost River. Sites 66 and 74 are high priority sites because the erosion threatens to damage irrigation diversion headings. Site 57 threatens the riparian zone property of a private landowner.

2. Nonstructural Methods of Riverbank Stabilizaton

   The 208 Project demonstrates the value, importance and effectiveness of using the vegetation and large organic debris present along the riverbanks in a manner that enhances the long term stability of the river environment. BLM recognizes the significance of these findings and intends to apply this knowledge to the problems identified by the 208 Assessment.

   Large organic debris in the form of floatable logs, fallen trees, log jams and beaver dams, will be managed to protect stable streambanks and reduce bank erosion. Debris management will include removal and careful placement in secure, stable locations, on an as needed basis. The log jam at Site 66 will be removed during the spring or summer of 1982.

   Revegetation and rehabilitation of all of the BLM problem sites will be initiated in summer of 1982. As funds permit, sites will be either seeded or planted with willows, dogwoods or another suitable riparian species to increase the vegetative bank protection.

3. Monitoring and Inventory

BLM will assist the Butte Soil Conservation District Upper Valley Mackay River Group in monitoring the problems along the river and evaluating maintaining and improving all riverbank stabilization projects implemented on the Big Lost River. Technical assistance will be provided upon request. If funds and personnel are available, BLM will continue water resource inventories and environmental studies conducted in cooperation with the U.S. Geological Survey, U.S. National Forest Service, Idaho Department of Health and Welfare, Division of Environment and Idaho Department of Water Resources.

4. Multiple Resource Management

BLM is presently preparing a Management Framework Plan (MFP) for the Mackay and Big Lost Planning Units of the Salmon and Idaho Falls Districts. During 1980 and 1981, resource inventories were conducted in many disciplines including hydrology, soils, range, forestry, wildlife and fisheries biology, recreation and cultural resources. This information is now being evaluated by BLM to formulate opportunities and alternatives to the management of the lands within these 2 areas. The land use document, is to be prepared in draft form during the Spring, Summer and Fall of 1982.

The 208 Assessment on the Big Lost River has had a very significant influence on the future of watershed and riparian zone management in the BLM Mackay and Big Lost Planning Units, in that the problems identified by the 208 program are the issues that will be addressed in the land use plan (MFP) by BLM.

The problems, concerns, conflicts and solutions identified by the 208 Assessment Program are thus being considered and evaluated within the framework of the Bureau Planning System. The final recommendations for the implementation of the 208 program for BLM will help provide a basis for future funding allocations.

BLM will continue to evaluate the impacts of all range, forestry minerals, energy and other types of land management actions in the Mackay Planning Units to ensure that the water resources are adequately considered and the land use values of the Big Lost River are maintained, protected and when possible, enhanced.

V. Impacts of Plan Implementation

The implementation of the plan to apply the selected "Best Management Practices" on BLM land will have many beneficial short and long term impacts. There will be an adverse short term economic impact on the BLM for allocating funds for riverbank stabilization. These costs will be outweighed by the primarily intangible benefits that will be derived from the project by adjacent landowners, whose lands are protection from erosion by irrigation water users along the river, downstream water users, particularly those dependent on the long-term capacity of Mackay Reservoir, by recreationists who utilize the river and the reservoir and by, the landowners who also implement BMP's on their private lands.

Specific short term benefits include:

1. Stabilizaton of eroding river banks.
2. Reduction of sediments input to river system with resulting reduction in impacts to downstream river sections.
3. Improved fisheries and wildlife habitat at sites where BMP's are implemented and in downstream river sections.
4. Protection of highly valued, productive agricultural lands adjacent to river.
5. Increased flood and sediment damage protection and hazard awareness.
6. Correct and rehabilitate problems created by past channel alterations.

Long term benefits include:

1. Meeting the water quality management goals of Sections 208 and 304 of the Clean Water Act of 1972, Public Law 92-500.
2. Improve and protect water quality and the uses the Big Lost River and Mackay Reservoir support.
3. Reduce sedimentation rates in Mackay Reservoir and prolong the effective life expectency of the reservoir.
4. Reduce erosion and sedimentation problems below the reservoir.
5. Improve recreational opportunities on the Big Lost River and at Mackay Reservoir.
6. Enhance fish and wildlife habitat along the Big Lost River and in Mackay Reservoir.
7. Reduce the erosional impacts on irrigation diversion structures and on existing ditches.
8. Protect private, city, county and state roads and bridges from erosion.
9. Reduce costs of maintaining and repairing irrigation systems.
10. Improve level of management of riparian zones.
11. Increase inter-agency cooperation in the mutual fulfillment of legislative goals and policies.
12. Reduce dollar expenditures in fulfillment of agency mandates, policies, laws and executive orders.
13. Increase public participation in Conservation awareness, education, practice and management.
14. Increase the level of communication, interraction, cooperation between the private citizens and government agencies concerned with land management issues and decisions.

APPENDIX IV

US Forest Service Big Lost River Management Area 208 Water Quality Project

Big Lost River Management Area
208 Water Quality Project

USDA Forest Service
Challis National Forest
Lost River Ranger District
Mackay, Idaho 83251

Big Lost River

Description

The Big Lost River Management Area includes all of the National Forest land within the headwaters of the Big Lost River except that portion within the Pioneer Mountain, Ryan Peak, Germania Creek management area. Main tributaries included in these headwaters are the North Fork and the East Fork of the Big Lost River, Summit Creek, Wildhorse Creek, Alder Creek and Antelope Creek. The management area is 340,000 acres in size. Ninety-three percent, 317,155 acres, is within Custer County while 5.9 percent or 20,125 acres, all on the south side of Antelope Creek, is in Butte County. The remaining .8 percent or 2,720 acres in the head of Fish Creek, which enters the Wood River system, is in Blaine County.

Elevation ranges from 6,500 feet in the foothills near Mackay to peaks just under 12,000 feet. Outstanding peaks include Big Black Dome (11,353), Smiley Mountain (11,505) and Mount McCaleb (10,273). A most outstanding scenic attraction is the Copper Basin area, a broad and rolling mountain basin at 7,800 feet elevation and about 30 square miles in size, situated at the headwaters of the East Fork of the Big Lost River and surrounded on three sides by spectacular mountain peaks.

About 50 percent of the area is Challis Hillslope Land which occurs as a broad continuous band along the eastern edge from Jerry Peak on the north to Fish Creek

Summit on the south.

The band is broken around the White Knob Mountains where a conglomerate of land type groups occur. The Challis Hillslope lands are the foothills region and are characterized by a mature, rolling topography that has been well-eroded but stabilizing. Because of relatively little rainfall, vegetation generally is of low stature and sparse with pockets of timber only on some north slopes and in some stream bottoms. These areas are some of the more stable lands within the planning unit but, at the same time, are the least productive.

The second largest group are the Glaciated Lands which occur as scattered blocks associated mostly with the Pioneer Mountains and surrounding peaks. These consist of U-shaped valleys and oversteepened slopes with stringers and patches of Douglas fir, Englemann spruce, subalpine fir and some white bark limber pine. The steep slopes of these lands contribute generally to a moderate to high erosion hazard, sedimentation rate and surface runoff. Timber productivity is low to very low and forage productivity is moderate.

The Depositional Land group is the third largest group in the management area. It includes the alluvial material along streams and rivers and is also the 30 square mile Copper Basin area. These are the most productive lands in the area and are characterized mostly by sagebrush-grass with willow, aspen and cottonwood trees growing in the wet areas along stream courses and Englemann spruce and lodgepole pine trees growing in the upper reaches of the group. Because of the gentle topography and continuous link of the depositional lands, transportation corridors and areas of concentrated use are best suited to this land group.

There are certain land types within the group that are exceptions to this suitability, however.

Strongly Glaciated Land forms are the fourth largest group. The largest block within this management area is centered around Lake Creek Lakes-Iron Bog Lakes. Extensions of Strongly Glaciated Lands of the Pioneer Mountains Management Area, Big Falls Creek Lake locale and within the White Knob Mountains also extend into this area. Lakes within this management area are found in the cirque basins of this land group. This land group, except for the cirque basin lands, has high to very high erosion hazard, very high snow avalanche hazard, high to very high sedimentation rate and surface runoff rate. Vegetation productivity is very low, except for the cirque basins.

The Challis Mountain Land group found within the North Fork of the Big Lost River and in the White Knob Mountains, the Wood River Mountain Land group scattered throughout the area and the Wood River Hillslope Land group, also scattered throughout the area, collectively make up about 15 percent of the area. Each of the three groups has a variety (ranging from low to very high) of erosion, sedimentation and surface runoff hazards, depending on the land types found within each group. Timber productivity is generally low and forage productivity is generally moderate.

Fishing opportunities in this management area include about three mountain lakes and over one hundred miles of streams. Lake fishing in this management area is concentrated mostly around Big Fall Creek Lake. Stream fishing is scattered throughout the area and the most fishable streams have access roads along side.

In 1972, use figures for the management area were 37,100 fishing days. Sections of some streams have been damaged by livestock grazing and by natural factors such as heavy surface runoff caused by rapid spring snow melt and high intensity summer storms.

The four big game species found within this area include antelope, mule deer, mountain goat and elk. 1972 use figures were 11,550 hunter man-days for all the huntable species. There are nearly 186,000 acres of key wildlife habitat in the area including such areas as big game winter range, mountain goat range, calving and fawning areas, booming, strutting and nesting areas, waterfowl habitat areas, etc.

Range Management on Allotments

The Big Lost Management Area contains three cattle and horse allotments and one sheep and goat allotment. These are Boone Creek, Copper Basin, Wildhorse and North Fork respectively.

The Boone Creek allotment is permitted 1,337 cattle for 5,794 animal months or 7,648 Animal Unit Months. The grazing system is divided into five units: two spring-fall units and three summer units. Units are rotated or are a deferred pattern of use. The last unit is basically rested. Improvements on the allotment include fifty stock watering ponds, twelve miles of unit fence, ten miles of division fence between the Copper Basin and Boone Creek allotments and various grazing impact studies. Studies consisting of photo point transects and utilization cages are planned for Fox Creek, Ramey Creek, Rock Creek, Garden Creek and Boone Creek as funds allow. Good salting and riding practices have helped keep cattle out of stream bottoms. Twice a year, 1,300 head of cattle cross the East Fork of the Big Lost when moving from unit to unit. Cattle become concentrated in a small area of about a 1½ mile radius and cause damage to the watershed. The fence between the Garden Creek and Rock Creek units is located along the bottom of Big Boon Creek. Cattle trail along this fence and beat down the area. This unit fence will be relocated out of the creek bottom and away from the riparian zone. The Range analysis data and Boon Creek allotment management plan are outdated. This information will be updated and revised as funds become available. Based on 1964 analysis data, the range condition has gone from poor to fair and continues on an upward trend.

The Copper Basin allotment is permitted 2,863 cattle for 12,069 animal months or

15,931 Animal Unit Months. The grazing system is divided into seven units. Three of the units are in a rest-rotation system with the remaining four rotated on a deferred pattern of use. Improvements include 380 water developments, ten miles of division fence between Copper Basin and Boone Creek allotments, thirty-three miles of unit fence and livestock exclosures and seeding plots. There are wildlife/livestock exclosures and experimental seeding plots in the Corral Creek and Navarre Units. Livestock exclosures are also present at Smelter Creek in the Swamps unit, in Basin Flat and in Lehman Basin. Based on range analysis data, range condition is in stable to upward trend with the exception of the Navarre unit and the stream bottoms of the East Fork of the Big Lost. The Navarre unit contains shallow, unstable soils prone to erosion in the form of gullies and washes. Attempted reseeding and the present grazing system have helped improve range condition. The East Fork of the Big Lost contains eroded streambanks, sedimentation and damaged riparian vegetation. Increased or better salting and riding practices combined with a revised grazing system should lessen damage to the watershed.

The Wildhorse Allotment is permitted 2,123 cattle for 8,002 animal months or 10,563 Animal Unit Months. The grazing system is divided into six units: two spring units and four summer-fall units. Five units are in a deferred pattern of use and one unit rested. All six units are basically natural drainage areas and are designed to fit with the necessary "Around the Horn" cattle movement. Improvements include water developments, unit fences, salting and riding. Each unit is planned to have four permanent bench marks established. One of these four will have a three-step trend study installed. Grazing impact studies and photo points will be set up on each bench mark as funds allow. Most of the major

stream channels within the allotment show disturbed streambeds from past floods and continuing streambank erosion. Most of this damage has been and is being caused by floods from the bare rock formations adjacent to and above the allotment itself and past heavy livestock use. The grazing system and the Wildhorse allotment management plan are in the process of being re-analyzed, updated and rewritten. Range trend has improved from poor to stable with the present grazing system. The revised system should put the range on an upward trend.

The North Fork Allotment is permitted 1,252 sheep for 3,214 sheep months. The grazing system consists of five units on a four pasture rest-rotation system. Past improvements on the allotment have been quite minimal. Two 3-photo point plot studies were installed in the Blind Canyon and Hunter Creek units in 1969. Studies are planned for the other units as funds become available. The planned studies are designed to show soil condition & trend and ground cover increase or decrease to insure improved watershed contion results. There are numerous small "sore spots" scattered throughout the allotment. The largest of these are found along the old sheep driveway between the heads of Slide Canyon and Hunter Creek and in the upper two-thirds of the Hunter Creek drainage. These spots are fairly isolated and should be brought back to more satisfactory watershed condition faster by the revised allotment management plan and revised grazing system. Range condition has progressed from poor to fair and continues on a stable trend. This allotment has the old multiple use survey on it. It is scheduled for an allotment management plan and environmental statement in 1983.

Permittees for the Big Lost Management Area Allotments are required to maintain ponds, fences and other improvements, close all gates, salt ahead of the turnout

date in each unit, submit yearly grazing fees and submit a year-end grazing report. Permittees belong to Cattlemens' Associations and must meet in their separate Associations once a year with the Forest Service.

Future plantings for wildlife range improvements will consist of site-specific adapted plants to ensure seedlings will survive in the selected planting areas.

Planned wildlife improvements for the Big Lost Management Area include riparian habitat studies, big game winter range exclosures, experimental seedings on wildlife ranges, improvement and protection of key habitats such as calving areas, aspen and mahogany stands, nesting and brooding areas, summer ranges, snags, etc., prescribed burns and modification of existing and future water developments for wildlife use.

A riparian habitat exclosure will be built on the East Fork of the Big Lost between Cabin Fork and Corral Creek in the fall of 1981. The objective of the exclosure is to protect the streambank and surrounding vegetation from cattle and improve stream habitat for fish. Willow (salix spp.) will be planted within the exclosure to help stabilize banks. Riparian habitat studies are planned for each Range Allotment within the Big Lost Management Area as funds become available. Two waterfowl exclosures are located in the Copper Basin Flat area in the potholes on the West Fork of the Big Lost. Two of the seven potholes are fenced from cattle use to create undisturbed habitat for waterfowl, songbirds and other non-game species.

Possible future prescribed burns are being planned for Banana Gulch, Flat Top, Grant Creek, Boone Creek, Wood Road, Lake Creek, the East Fork of Lehman Creek and Coyote Creek.

Objectives of the burns are to increase forage production, edge effect and provide for more diversity in habitat types. Aspen and Willow rejuvenation projects

Wildlife and Fisheries Management

Past wildlife habitat improvements in the Big Lost Management area have been few. In 1961, a wildlife/livestock exclosure was built in the West Fork Navarre Creek to determine, by comparison with a completely protected area, the impact of game and cattle on the soil and vegetation on a large foothill zone area. Browse utilization transects were set up on the West Fork Navarre Creek and Marsh Canyon in 1961. Each transect consisted of ten permanently tagged browse plants. Each shrub had two tagged branches and the current year's growth above each was measured before and after game use. A pellet group count was also conducted at the same time the transect was checked. These transects are outdated and need to be re-analyzed and possibly relocated.

Five browse species were planted in Navarre Creek in 1971 to improve the depleted deer winter range in that area. A total of 287 plants consisting of Deerbrush (Ceanothus integerrimus), Wedgeleaf ceanothus (Ceanothus cuneatus), Cliffrose (Cowania stansburiana), True Mountain mahogany (Cercocarpus montanus) and Curl leave mountain mahogany (Cercocarpus ledifolius) were planted. The shrubs were planted on two sites, eastern and western, about 50 yards apart on a south slope. Existing native vegetation in the area is sparse with much bare soil. The soil is very high in clay content, with a conspicuous erosion pavement, and appears to be shallow over most of the area. Plant survival rate was low due to the difficulty of extracting sufficient moisture from such a heavy textured soil. In 1972, 1,950 bitterbrush seedlings (Purshia tridentata) were planted in the area north and west of the Navarre Creek exclosure. Ten plants were planted in each of the two sections of the exclosure. Survival rate for these plants was also low.

are planned for Butcher Creek, Grant Creek, Rock Creek, the East Fork Big Lost River, the East Fork Boone Creek, Garden Creek and Horse Wallow. Objectives of these projects are to provide continuous stands of viable and healthy Aspen and Willow for cover, food and nesting.

Data for a wildlife habitat resource base is scarce for the Big Lost Management Area. Wildlife habitat and species inventories are currently in progress to assess the quality and quantity of the habitats and to identify potential conflicts and habitat improvement projects.

In 1976, thirty log wiers or check structures were installed in Summit Creek to increase the amount of pool area in proportion to present riffle area of the stream. These structures improve fish habitat in the lower sections of the stream where natural resting, feeding and cover habitat are lacking. The project is located in T6N, R 19 E, sections 2, 3 and 10. The project on the East Fork Big Lost River (30) has been done and addition projects are being planned for Bear Creek (20) and Starhope Creek (20). The East Fork Big Lost River and some of its tributaries contain 75 fish wiers for stream habitat improvement. Twenty-two more are planned in 1981 and another 25 in 1982. Exact locations have not yet been determined. There are no anadromous fish present on Forest Service land in the Big Lost Management Area.

Watershed Management

In 1978, four water quality monitoring stations were placed on the Summit Creek, North Fork, Wildhorse and West Fork tributaries of the Big Lost River. These stations will detect, at an early stage, any significant changes in siltation resulting from management practices and ensure that projects comply with the State water quality standards. Due to lack of funds and data base, watershed stabilization projects are minimal at this time. As money and manpower become available, deteriorated watershed areas will be inventoried and prioritized for improvement. No soil-disturbing activities in critical watershed areas will be authorized unless designed and maintained to prevent unacceptable soil movement or degredation of water quality. Minimum stream flows will be maintained by restricting new diversions from existing streams. Timber harvesting in the upper watershed will consist of firewood, post and poles and commercial sales for a total of 3 million board feet in the North Fork Big Lost and 2 million board feet in the East Fork Big Lost. East Fork sales will depend upon the completion and analysis of compartment exams. Exams are expected to be finished by October 1981.

Conclusion

The Challis National Forest is strongly aware of our responsibility to provide sound management and protection for one-half million acres of National Forest land of the Big Lost River watershed. We have placed particular emphasis upon retoring areas of deteriorating range and improving the watershed through coordination with other resource uses and activities such as timber harvest, mining exploration and Forest recreation. The Forest Service will continue to cooperate with State and other Federal agencies, Butte Soil Conservation District, ranchers and the concerned public to improve, restore and protect the Big Lost River watershed.

We feel that the Big Lost River 208 Water Quality Project is an excellent way to achieve common resource goals. A coordinated planning and implementation effort by all agencies and individuals involved with the Big Lost River is vital.

APPENDIX V

US Forest Service Fisheries Habitat Evaluation and Plan for the Big Lost Watershed

Introduction

The Big Lost River drainage from the Challis National Forest boundry to the headwaters contains 72 named rivers, streams, gulches, canyons and draws. These comprise approximately 475 kilometers (295 miles) of stream channel of which about half would be considered perennial. The valley bottoms reflect the strong influence of glacial activity with many of the headwater streams being located in narrow, V shaped canyons. The lower reaches of the drainage depict both U-shaped and open valley bottomlands. The glacial deposits in the lower reaches of the drainage are characterized by small rock materials which allow stream channel movement in a meandering fashion. The drainage covers an area of approximately 243,000 acres (Fig. 1).
The fish species for which this plan is developed include rainbow trout (salmo gairdneri) and brook trout (Salvenlinus fontinalis). Several other species will be influenced by the actions; these include mountain whitefish (Prosopium williamsoni) and sculpin (Cottus sp.). Rainbow trout include both wild and hatchery fish.
This management plan will present a habitat evaluation along with suggested habitat improvement and coordination activities for the major streams in the Big Lost River drainage. The plan is highly flexiable in that as additional information becomes available specific improvement and coordination activities for other streams to the plan.

Management Objectives

The overall management objective of this plan is to develope and implement a systematic habitat improvement and resource coordination program in the headwaters of the Big Lost River by the end of FY 1980. Several other objectives are tied to the plan. These objectives are:

1. Improve quality and quantity of the shelter component of stream habitat. This would be primarily tied to improving the quality and quantity of pool habitats. Implemented in 1980 and on going.
2. Improve streambank stability on streams having conditions that are adversely influencing fish populations. Implemented in 1980 and on going.
3. Improve multiple use coordination between the dominant resources (i.e. range, recreation, fisheries, and minerals). From 1980 on.

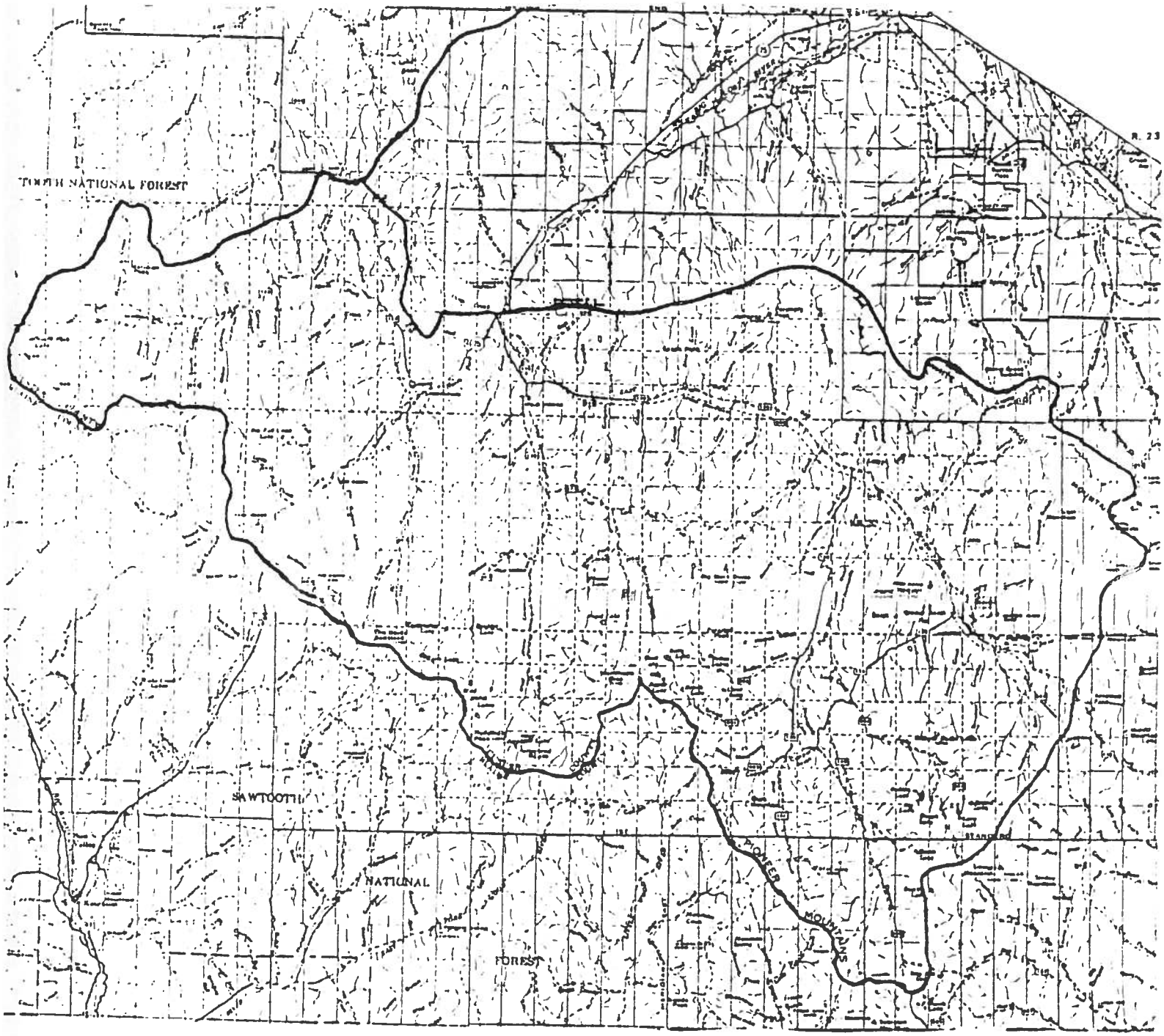

Figure 1 - This is an outline of the Upper Big Lost drainage area dealt with in this plan.

4. Coordinate Forest Service Habitat improvement projects with Idaho Fish & Game species management goals, objectives and policies as outlined in their "plan for the Future Management of Idaho's Fish and Wildlife Resources".

History of Species and Managment

Past and present species management of the area streams is closely tied to supplemental stocking with catchable size rainbow trout. Wild populations of rainbow and brook trout are also present. A minor population of cutthroat trout was, at one time, established in Lake Creek. Present status of this cutthroat population is unknown.

Approximately 29,000 catchable rainbow trout have been stocked annually in the upper drainage. The East Fork receives slightly more than 35% of the annual quota with Summit Creek, Wild Horse Creek and West Fork Big Lost River each reveiving approximately 15% of the annual quota. The remaining 20% is divided between Lake Creek, Kane Creek and the North Fork of the Big Lost River (Appendix). During the 1979 field season, 82 stations were surveyed on 18 streams. These comprised the major streams in the drainage and accounted for about half (220 kilometers) the stream miles. The surveys collected data on stream bank condition, stream morphology, substrate make-up and riparian vegetation .

To present a systematic representation of habitat condition, major problems associated with habitat condition, major problems associated with habitat condition, potential improvement projects and needed multiple use coordination, each stream will be discussed separately.

East Fork Big Lost River

Habitat Situation

The East Fork of the Big Lost River is 18 miles long and averages 39 feet wide and 10 inches deep. The average gradient through the 12 stations surveyed was 1.8%. Fish species found during the survey were rainbow and brook trout.

Several parameters measured during the survey on the East Fork showed up to be in the problem range. Stream cover and vegetative bank cover were both low. Bank rock size is in the small range (≤ 6") and this along with the high ungulate use is contributing to the high amount of unstable banks (45%). Substrate composition was classified as fair with approximately 30% of the bottom materials being sand and silt. Pool-riffle ratio was low with only about 11% of the stream being pool habitat.

Major Problems

The major problems illustrated by the survey were:

1. Stream cover - Reduced amounts of stream cover is presently limiting resident fish populations and adversely influencing the success of the catchable rainbow stocking programs. This is especially true in the upper reaches of the East Fork.

2. Streambank instability - Streambanks had a high degree of instability. The increased sediment generated by this condition is influencing fish production by adversely effecting food organism production and natural reproducition. Streambank stabilities reflect coordination conflicts between aquatic and grazing resources, espically in the upper half of the drainage.

3. Limited pool habitat - The low percentage of pool habitat is limiting the effectiveness of the catchable trout stocking program. Because of the lack of suitable pool habitat as much as 25% of the fish stocked are likely leaving the area prior to being harvested by anglers.

Habitat Improvement Projects

1. Pool habitat improvement - In order to improve upon pool quantity and quality, artificial placement of pool forming devices is needed.

a. Log wiers/check dams should be constructed in the upper reach of the stream (above confluence with West Fork). These structures should be installed approximately 7 to 9 channel widths apart at sites with good streambank stability. Use of fine mesh hardware cloth or wire may be necessary to increase structure stability. Locations should be coordinated through the Forest Fishery Biologist.

b. Large boulders should be placed in the lower reaches of the East Fork. These structures will provide the necessary cover and holding habitat without creating bank stability problems. Placement should be coordinated through Forest Fishery Biologist.

It is estimated that the lower area could use from 250 to 400 rocks to provide pool habitats.

2. Bank stability improvements - In order to increase streambank stability several projects should be undertaken.

a. Willow planting could be completed in areas where minor instability problems exist. It is anticipated taht 10 acres of willow planting could be completed.

b. Bank revetment could be undertaken in severe cases of instability

Either log or rock revetment could be used. No estimates of the amount if any of this type of work that can be done.

Multiple Use Coordination

The upper reaches of the East Fork lie within the Copper Basin C & H Allotment. At present, the stream bisects two units within the allotment. Streambank instabilities within these stream areas are closely associated with livestock grazing. Intensive coordination is needed between grazing and fishery programs to reduce conflicts.

Wild Horse Creek

Habitat Situation

Wild Horse Creek is a tributary of the East Fork of the Big Lost River. The stream is 18 miles long and averages 28 feet wide and 7.8 inches deep. The gradient through the 7 stations surveyed averaged 2.3%. Brook trout were the only species of fish identified during the survey. Rainbow trout are heavily stocked in this stream.

Wild Horse Creek reflected characteristics similiar to the East Fork. The glacial deposits located in the lower reach of the stream tend to generate unstable channel conditions. The unstable conditions were accelerated by some land use activities. Habitat conditions reflected reduced stream cover, low vegetative bank cover, small bank rock size, a high percentage (42%) of unstable banks and a low percentage (4%) of stream in pools.

Major Problems

1. Limited pool habitat - The low percentage of pool habitat is limiting the effectiveness of the catchable trout stocking program.
2. Limited streamside vegetation - Reduced amounts of streamside vegetation were reflected in the surveys. The lack of stramside vegetation was contributing to channel instability to a certain degree. Hiding cover generated by streamside vegetation was limited.
3. Streambank instability - Nearly half of the streambanks were classified as unstable. This condition was a function of natural channel make-up, watershed

and runoff characteristic and land use activities.

Habitat Improvement Projects

1. Pool habitat improvement - In order to improve pool quantity and quality, placement of artificial pool forming devices is needed.

a. Log weirs/check dams could be constructed in the upper areas of the stream. Sites should be carefully evaluated to avoid maintenance and stability problems that could develope. Locations should be coordinated through the Forest Fishery Biologist. At present, it is estimated that up to 30 structures could be placed in this stream.

b. Large rocks and boulders should be used to develope pool habitat in the lower reach of this stream. Use of this habitat improvement option would greatly reduce the potential for creating addition of unstable conditions. This option would also appear more natural. Approximately 150 to 300 rocks could be placed in this stream.

2. Streamside cover would be improved by willow planting. This option would not only increase the cover componenet of the stream but would also benefit bank stability. Ten acres could be planted with willows.

3. Bank stability improvement can be undertaken through the use of revegetation projects and on specific sites of severe instability the use of log or rock revetment may be needed. At present the amount of this type of channel improvement is unknown.

Multiple Use Coordination

Increased coordination is needed between livestock management and aquatic resource protection. The survey results indicated that conflicts were evident in certain stream areas. Activities and projects that would create better distribution should provide for improvement in the riparion zone and aquatic habitat.

Fall Creek

Habitat Situation

Fall Creek is a tributary to Wild Horse Creek, and is 6.0 miles long and averages

23.4 feet wide and 7 inches deep. The gradient through the 2 stations surveyed averaged 2.0 percent. Brook trout were the only fish species identified during the survey. Habitat analysis revealed that stream cover was low, bank rock size was small and bank instability was fairly high at 32%.

Habitat Improvement Projects

There are no specific habitat improvement activities or projects identified for Fall Creek at this time. There may be specific projects identified in the future to remedy the minor problems that do exist.

Big Boone Creek

Big Boon Creek is another tributary to the East Fork. The stream is approximately 5 miles long with an average width and depth of 5.5 feet and 3.9 inches, respectively. The average gradient through the 3 stations surveyed was 5%. Stream banks were generally composed of small bank rock materials. Streambank stabilities were approaching problem status with 27% of the banks in unstable condition. Pool habitats occured in about 24 of the stream habitat and the quality of these pools was extremely low. The overall habitat condition was judged to be 39% of optimum which would place the stream in the poor catagory. Rainbow trout were present in the stream.

Major Problems

1. Poor pool quality - The pool habitats surveyed were of very poor quality. Most pools were small and shallow. Cover component of the pools was also poor.
2. Streambank instability - Streambank instability was approaching the problem status. A large amount of this instability can be related to livestock trampling of the streambanks.

Habitat Improvement Projects

1. Pool quality and quanitity improvements - Pool quality can be improved by increasing the depth and size of the existing pools. To accomplish this log or rock structures could be placed at the head of the pools to creat hydrolic enlargement of the natural pool. Care should be taken to avoid installation of

excessively large structures. All such structures should be coordinated through the Forest Fishery Biologist. It is estimated that 30 to 40 structures could be installed to improve pool size and depth.
Willow planting would also improve the cover component of the existing pools. One or two acres could be planted.
2. Streambank stability - Streambank stability can be enhanced through establishment of willows or other forms of woody vegetation. Rock or log revetment may be necessary at specific locations. At present, no specific revetment projects are recommended.

Multiple Use Coordination

Conflicts between livestock grazing and the stream resource was evident at some sites. Management techniques which can influence livestock distribution and reduce excess use of the riparion zone are recommended.

Fox Creek

Habitat Situation

Fox Creek is 5 miles long and averages 7 feet wide and 4 inches deep. Gradient within the two stations surveyed averaged 2%. Brook trout were the only fish species identified in this stream. Stream cover and vegetative bank cover were low and bank rock size was small. Ungulate use along the stream was extremely heavy and the percentage of unstable banks was 46% and deposition of fines was 33%.. Pool - riffle ratio was excellent with mainly half of the stream habitat in pools. Pool quality, however, was only fair and improvement would be beneficial.

Major Problems

1. Streambank instability - Survey results indicated that nearly 50% of the streambanks were in an unstable condition. This condition also strongly influenced substrate composition. These two factors would be limiting the fish population.
2. Pool quality - Pool quality was low because of size, depth, and cover limitations. This factor would also be limiting the fish population.

3. Resource Coordination - Ungulate use along this stream was extremely heavy and has created conditions of streambank instability and sedimentation. Removal of streamside vegetation has also limited hiding cover.

Habitat Improvement Projects

1. Inprovement of streambank stability - Willow planting, encouragement of establishment of grassy banks, and revetment of specific sites will increase streambank stability. It is estimated that from 1 to 2 acres of improvement could be accomplished.
2. Pool quality improvement - The methods described for Big Boone Creek apply here in Fox Creek. Placement of these structures should be closely controlled and reviewed by the Forest Fishery Biologist. It is estimated that 20 to 30 structures would benefit the stream habitat.

Multiple-Use Coordination

The survey indicated that heavy livestock use of the riparian zone has created undesirable conditions in the aquatic habitat. Careful review of the present livestock management program should be undertaken to evaluate possible changes to minimize conflicts.

West Fork Big Lost River

Habitat Situation

The West Fork is the largest tributary to the East Fork Big Lost River. The stream is 8.5 miles long and averages 36 feet wide and 7.8 inches deep. The gradient through the 4 stations surveyed averaged 1.5%. Fish identified during the survey were brook and rainbow trout.
The aquatic habitat was characterized by limited streamside and streambank vegetative cover, unstable banks (55%), a very small number of pools (3% of the stream) and poor pool quality. The majority of the stream channel flows through glacial outwash materials which have inherently high instability characteristics.

Major Problems

1. Pool habitat quantity - The major factor influencing the fish population

and the rainbow trout stocking program is limited pool habitat. The relatively wide and shallow stream channel provide little holding habitat for the catchable rainbow which are stocked in the area.

2. Stream channel instability - Instability is another factor which is exerting a major influence on fish habitat. The nature of the West Fork Big Lost River stream channel drastically influences improvement options.

Habitat Improvement Projects

1. Pool habitat improvement - Fish populations would benefit from an increase of pool habitat. At present, a very limited amount of holding habitat is available. To correct this situation the following projects are proposed:

a. Placement of log and/or rock weirs should be installed in the extreme upper reach of the stream. This would be immediately below the upper stream crossing, near the mouth of the Star Hope Creek. These structures should not be placed in the stream where widths exceed 10 to 12 feet. All installation sites should be coordinated by the Forest Fishery Biologist.

b. Boulder or large rock placement would greatly enhance pool frequency in the lower section. Because of the shallow nature of the channel, selection of the size of rocks and positioning will be important. It is estimated that the lower reach of the West Fork could benefit from addition of 200 to 250 rocks.

2. Streambank instability - Streambank instability can be reduced by vegetation planting and potential revetment. At this time no specific stabilization projects are suggested.

Multiple Use Coordination

The majority of the West Fork Lost River lies within the Potholes Unit of the Copper Basin C & H Allotment. Livestock grazing conflicts have occured in the past and there are still streamside areas that are being negatively affected by the grazing. Increased coordination could help to minimize conflicts.

Bellas Gulch

Habitat Situation

Bellas Gulch is a small tributary to the West Fork and is approximately 2 miles

long. The stream channel averages 11 feet wide and 6 inches deep. The overall habitat analysis would place this stream in the good category. There was a fairly high amount of fines associated with the substrate. The one station surveyed had a 12% gradient. No fish were seen during the survey.

Habitat Improvement Projects

There are no habitat improvement projects proposed for this stream.

Broad Canyon

Habitat Situation

Broad Canyon, another tributary to the West Fork, is 6 miles long and averages 13.5 feet wide and 6 inches deep. Stream gradient through 4 stations surveyed averaged 3.5%; the fifth station was 22%. Brook trout were the only fish identified during the survey. Habitat characteristics in Broad Canyon can be described as fair. Substrate observations indicated a moderately high percentage of fines associated with the gravels. There was some channel cutting taking place which may account for some of the fines in the substate. Vegetative bank cover and stream cover provided by riparian vegetation was low. Pool habitats were of high quality but the frequency of accurance was low.

Major Problems

1. Pool habitat - Lack of pool habitat is limiting, to some extent, the fish population in Broad Canyon.
2. High concentraion of fines in substate - The high concentration of fines in substate materials could not be attributed to a specific cause.
Apparently natural conditions include this high percentage of fine material. Additional evaluation of the Broad Canyon drainage is needed to fully evaluate this condition.

Habitat Improvement Projects

1. Pool habitat - The fairly low number of pools may be remedied through placement of log and/or boulders in the stream. Specific site determination should be coordinated by the Forest Fishery Biologist. At this time no specific

estimate as to number has been determined.

Muldoon Canyon

Habitat Situation

Muldoon Canyon, another tributary to the West Fork, is 8.5 miles long and averages 10 feet wide and 6 inches deep. The gradient averaged 2.3% through the 4 stations surveyed. The amount of stream cover was good and was composed primarily of woody vegetative forms. The amount of bank vegetation was also in the good category and covered form 75 to 90% of the stream banks. Bank rock content was high with the majority of materials in the 5 to 6 inch range. The amount of bank cutting and sediment deposition was limited and within acceptable levels. Livestock impacts were moderate with less than 50% of the banks showing signs of excessive use. Pool habitat within the stream was limiting, with only 15% of the stream being made up of pools. The pools were of good quality.
Brook trout were the only fish seen during the survey.

Major Problems

Quantity of pool habitat - The limited amount of pool habitat surveyed in Muldoon Canyon is considered a major limiting factor effecting the fish populations of the stream. Most other habitat characteristics are suitable for maintaining good to excellent fish populations.

Habitat Improvement Projects

Pool habitat - Additional pool habitats should be created through the use of log and/or rock weirs.
Structure size and location should be coordinated by the Fishery Biologist.
It is estimated that 40 to 60 structures could be installed in the stream.

Multiple-use Coordination

It was apparent from survey information that present coordination between livestock use and stream habitat conditions is suitable for maintaining the aquatic enviornment in good condition.

Star Hope Creek

Habitat Situation

Star Hope Creek, which flows into the West Fork, is 7 miles long and averages 9.5 feet wide and 4 inches deep. There were no fish observed during the survey but in all probability rainbow and brook trout inhabit the stream. Stream cover provided by riparian vegetation was low and the cover that was present was provided by brush species. Bank rock content was high reflecting the glacial influence on the drainage. A majority of the bank rock materials were over 12 inches in diameter. Bank cutting was minimal and deposition was primarily characterized by course materials located behind channel obstructions. The frequency of occurance of pool habitats was low with only 8% of the stream being pools. The quality of the pools sampled was excellent.

Major Problem

1. Limited pool habitat - The limited nature of pool habitats in Star Hope Creek would be reducing the fish population to some extent.

Hbaitat Improvement Projects

Pool habitat - Additional pool habitats should be constructed in this drainage through installation of log weirs and boulders. Log weirs should be installed in areas having highly stable banks. Areas with excessive widths and unstable conditions should be avoided. It is estimated that 20 to 30 structures could be placed in Star Hope Creek.

Little Lake Creek

Habitat Situation

Little Lake Creek, a small tributary to the East Fork, is 2.2 miles long and averages 3 feet wide and 2 inches deep. The average gradient in the two stations surveyed was 2.5%. The stream habitat was characterized as having moderate bank instability (25% of bank unstable), relatively high depositions of fine materials in the substate, and poor quality pools. Beaver activity was evident which would account, in part, for the high accumaltion of sediments. Rainbow trout were the only fish species observed.

Major Problems

1. Fine sediments - The high percentage of fines in the substrate as indicated by the data is in part due to one station being in a beaver pond which was silted in. Other beaver ponds also had heavy siltloads. If the beaver pond transect is removed, the percentage of fines is in the upper twenties which is still is the problem range. A solution to the siltation problem and the unstable banks is tied to livestock management that reduces use in the reparian zone. A luch riparian zone of adequate width is very effective in trapping sediment in overland water flow and preventing it form reaching the stream. The planting of vegetation can hasten the bank stabilizing process.
2. Pool habitats - It may be possible to increase the number of pools with log structure and boulder placement if feasible. The planting of cover around existing pools as well as the constructing of new pool should increase the pool quality for the stream.

Habitat Improvement Project

At present, no projects are suggested for Little Lake Creek. A further look into the feasibility of installing pool forming structures should be undertaken.

Corral Creek

Habitat Situation

Corral Creek, a tributary to the East Fork, is 8 miles long and averages 9 feet wide and 4 inches deep. Gradient averaged 2.3 percent through the 3 stations surveyed/ Brook and rainbow trout were present in this stream. The habitat condition of Corral Creek was fiar and was characterized by the following habitat features. Stream cover provided by riparian vegetation was limited and composed primarily of brushy species. Stream banks had a moderate degree of instability (36%). Substrate condition was in the poor category resulting from a fairly high concentration of sediments. Pool habitats were of excellant quality, even though pool qunity was low. There was a high amount of ungulate use of streamside areas indicated by the survey. Over 50% of the streambanks had trampling and sloughing associated with livestock use. There was little sign that conditions were improving following use periods.

Major Problems

The major problem in Corral Creek centered in conflicts between grazing and the stream resource.

Habitat Improvement Projects

No specific habitat inprovement projects are suggested at this time. Solution of grazing conflicts will require careful consideration of the site specific conditions.

Coyote Creek

Coyote Creek, tributary to Corral Creek, is approximately 4 miles long and averaged 3 feet wide and 3 inches deep. This small stream had limited stream cover provided primarily by grasses. Only one station was surveyed and it had a 1 percent gradient. Lakc of running water prevented sampling of more stations in higher stream reaches. The amount of vegetative bank cover was moderately high and provided some protection to the stream banks. Stream banks were characterized by having 25 to 50% small rock materials. There was some bank cutting taking place and a relatively high amount of deposition of sediment within the stream. Pool habitats were present in adequate numbers but pool quality was poor. Trout were present in the stream but the species were not identified.

Major Problems

1. Pool quality - Low pool quality is adversely influencing the fish population in Coyote Creek. Pools sampled were small and had limited cover. Sediment accumulations were developing further reducing the pools capacity to hold fish.
2. Grazing conflicts - There was a high amount of livestock use within stream-side area which is adversely influencing habitat characteristics.

Habitat Improvement Project

1. Pool quality - Quality aspects of existing pools can be improved through

willow planting to provide cover and placement of log structures to increase pool size. 10 to 20 pools should be identified for imrpovement.
2. Grazing conflicts - In order to reduce conflicts generated by livestock use of the streamside area, additional control of distribution and amount of use is needed. Livestock management should be reviewed by range personnel and biologists to determine what kinds of corrective actions can be taken, Streambank stability could be increased by willow planting and rock/log revetment at specific sites.

Multiple Use Coordination

There is a need for additional coordination between livestock use of the streamside area and protection of fishery habitat. These conflicts will probably be resolved to some extent through allotment management.

Cabin Creek

Habitat Situation

Cabin Creek, a tributary to the East Fork, is 6 miles long and averages 5 feet wide and 3 inches deep. The stream gradient through the 4 stations surveyed averaged 2.5%. Brook and rainbow trout were the fish species found during the survey. The overall stream habitat was poor. Habitat features were characterized as follows:. Pool habitats were very limited and of poor quality; Stream cover was fair and consisted of predominantely brush species. Stream banks were composed of a moderately high quantity of rock material of less than 3 inches. Bank cutting and sediment deposition were present in only moderate amounts.

Major Problems

1. Limited pool habitat - The limited nature of pool habitat and the poor condition of existing pools is functioning as a major adverse influence on fish populations.

Habitat Improvement Projects

Cabin Creek would benefit from a habitat improvement program utilizing in-

stallation of pool forming structures and developement of adequate stream side cover. Installtion of 15 to 20 structures is suggested and willow planting should be completed in conjunction with structure placement.

Multiple Use Coordination

Conflicts with livestock management were evident at specific sites. This stream would benefit from some reduction in livestock numbers and/or better distribution effots.

North Fork of the Big Lost River

The North Fork of the Big Lost River is 15 miles long and averages 19 feet wide and 8.6 inches deep. Gradient through the 9 stations surveyed averaged 3.6 percent. Brook trout were the only species identified during the survey but other species such as rainbow would be present as they are annually stocked in the drainage. The drainage reflects the influence of glacial activity with the upper stream reaches occuring in narrow V shaped valley bottoms and the lower reaches occuring in U shaped valley bottoms. The lower stream reaches flow through glacial outwash materials which allow considerable channel movement. Habitat characteristics of the North Fork reflect conditions similiar to Wild Horse Creek.

Substrate composition was dominated by smaller than 3 inches and the percentage of the bank composed of these materials was between 25 to 50 percent. In the lower stream reaches the small bank materials have allowed for increased channel instability. Stream banks on the average showed signs of cutting which exposed raw vertical banks. Deposition of course materials and to some extent sand and silt occurred behind channel obstructions and in bars. Riffle areas had some accumulation of fine materials and pool habitats had some accumulation of sand and silt. In general the stream substrate could be classified as poor. Riparian vegetation provided only moderate stream cover allowing much of the stream to have direct exposure to sunlight. In the lower reaches of the stream, grasses provided the bulk of streambank vegetation. Willows were present but were not dominant. The upper reaches had greater amounts of stream cover provided by brush and trees.

A major limiting factor influencing habitat condition was pool habitat. Pool

habitats comprised only 7% of the stream habitats surveyed. Five of the nine stations surveyed had no pool habitat present. In two stations, where pool habitat was found, quality was unusually high. The other two stations had pool habitat of extremely low quality.

Major Problems

1. Limited pool habitat - The major limiting factor effecting fish populations and the effectiveness of the present stocking program is the lack of adequate holding (pool) habitat. This is espically true in the North Fork below Park Canyon.
2. Channel instability - The instability that was present in the lower stream section was tied closely to natural conditions. The outwash materials generated by glacial activity are subject to generally high channel instability. Resource conflicts, such as grazing, can produce accelerated amounts of instability in areas of naturally unstable conditions.
3. Substrate composition - The high percentage of fines (34%) associated with the stream substrate would be a limiting influence on fish and fish food organisms. This undesirable condition is closely tied to natural conditions and should be a major management concern is as much that additional amounts of fine sediments generated from resource management should be minimized.

Habitat Improvement Projects

1. Pool habitat - the quantity of pool habitat should be increased to allow for additional holding and security areas for native and stocked fish. To accomplish this, two improvement options should be considered.
a. Boulder placement in the lower stream reach would greatly increase the available pool habitat. This option is more desirable than log structure installation because of stability considerations. It is estimated that 200 to 300 large rocks and boulders can be placed within the North Fork in the area between the mouth and Park Canyon.
b. Log structures should be installed in the North Fork in the upper drainage in areas with stable stream banks. Structure design and location should be verified by the Forest Fishery Biologist. At present between 30 to 50 structures could be placed in the streams.

2. Channel Stability - At this point no specific projects to increase channel stability are proposed. To minimize resource conflicts which can generate instability problems, careful coordination between resources is needed.

Multiple Use Coordination

Careful coordination between range and timber utilization is needed to reduce conflicts with protection and inhancement of the aquatic resource. Several timber sales have been proposed in the drainage and associated with these sales road construction and reconstruction will be necessary. To avoid adverse impacts close coordination will be necessary. The range management in the drainage includes both sheep and cattle grazing. Removal of riparian vegetation and accelerated streambank instability are potential problems which will need to be controlled. Allotment management should include periodic review of habitat condition and management plan effectiveness.

Summit Creek

Habitat Situation

Summit Creek is about 7 miles long and averages 15 feet wide and 8 inches deep. The average gradient through the 9 stations surveyed was 3.5%. Brook and rainbow trout were identified in the stream. Summit Creek, similiar to other area streams, has been strongly influenced by glacial activity. The upper stream reach above Park Creek is confined in a narrow steep valley bottom. The lower section is confined to a wider U shaped canyon. The glacial outwash deposits are form 3 to 6 inches in size. The lower stream section has cut through the glacial deposits and lies within a moderate gradient, narrow flat floored valley.

The overall habitat rating for Summit Creek was fair and this rating has been positively influenced by ongoing habitat improvement. Pool habitats have been increased through the placement of log structures in the stream. Pool quality was rated as good and this can also be attributed to the ongoing improvement work. Another habitat parameter which rated good was stream bank condition. Streambank cutting occurred at a few sites but was limited to outside banks with length equivalent to or less than the channel width.

Major Problems

The major problem of limited pool habitat was recognized some time ago and efforts to rectify the situation were begun in 1977 with the construction of log weirs. This program has been very successful and has provided additional habitat for both resident and stocked fish.

Habitat Improvement Project

Only the lower two stations were devoid of pool habitat. Channel configuration and bank characteristics do not lend themselves to use of log structures. Pool habitat in the lower section could be augmented with large rock or boulders. Thirty to forty large boulders would be helpful in increasing pool habitat.

The quality of the pools created would be beneficial and improved by willow planting to increase the amount of hiding cover. All structures should be considered as sites for willow planting efforts.

Phi Kappa Creek

Habitat Situation

Phi Kappa Creek is a small stream 4 miles long that averages less than 6.5 feet wide and less than 4 inches deep. Gradient within the 2 stations surveyed averaged 7% and no fish were seen.
The data indicated that lack of stream cover and pools along with high gradient were the limiting factors on the stream.

Habitat Improvement Project

Due to the high gradient, it may not be feasible to do any projects to increase the amount of pools but planting of vegetation such as willows could help to increase stream cover. No specific projects are proposed at this time.

Discussion

The data collected indicates that the majority of the Big Lost River Drainage, from where it enters the Challis National Forest to its headwaters, has been strongly influenced by past geomorphic processes. In some streams, impacts

resulting from multiple resource management are severe. Table 1 shows a stream by stream comparison of the parameters looked at during the survey. The following is a summary of the information in Table 1.

Stream Cover - Data indicated that 7 streams had more than 75% of their water surface exposed to direct sunlight for extended periods during the day.

Vegetative Bank Cover - 5 streams had less than 75% of their bank area covered with vegetation.

Dominant Vegetative Type - Only 2 streams had bank vegetative type that rated low.

Bank Rock Count - 3 streams had bank rock content less than 50%.

Dominant Bank Rock Size - 13 streams had average bank rock size less than 6" in diameter. This is fairly significant as small bank rock material makes banks susceptable to erosion if disturbed.

Bank Stability - 10 streams had bank stabilities of 70% or less.

Bank Cutting - None of the stream data indicated bank cutting lengths greater than stream widths.

Deposition of Fines - 10 streams showed fines (sand size and less) in the substrate at 30% or greater.

Pool - Riffle Ratio - 10 streams had 85% or less of total stream area in pool. Pool frequency was a major factor which reduced the overall habitat rating of streams in the headwaters of the Big Lost.

Pool Quality - 5 streams had only poor quality pools. Pool quality was another factor which strongly influenced the overall habitat rating of many streams surveyed.

Table 1 - This is a stream by stream comparison of streams surveyed in the Upper Big Lost River Drainage. An "X" means the stream rating indicated a problem existed with the given parameter.

ITEM RATED \ STREAM	North Fork Big Lost River	Summit Creek	Kane Creek	Phi Kappa Creek	East Fork Big Lost River	Wild Horse Creek	Fall Creek	Big Boone Creek	Fox Creek	West Fork Big Lost River	Bellas Gulch	Broad Canyon	Muldoon Canyon	Star Hope Creek	Little Lake Cr.	Corral Creek	Coyote Creek	Cabin Creek
Stream Cover				X	X	X	X		X	X							X	
Vegetative Bank Cover					X	X			X	X		X						
Dominant Vegetative Type												X						
Bank Rock Content															X	X	X	
Dominant Rock Size	X	X	X		X	X	X	X	X	X			X		X		X	X
Ungulate Use	X	X	X		X	X		X	X	X	X		X	X	X	X	X	X
Bank Stability	X	X	X		X	X	X		X	X				X		X		
Bank Cutting																		
Deposition of Fines	X	X			X			X	X		X	X			X	X	X	
Pool-Riffle Ratio	X		X	X	X	X				X	X		X	X				X
Pool Qaulity								X		X					X		X	X
#X / #Items = Priority Rating %	45	36	36	18	64	55	27	36	5[illegible]	64	36	27	27	27	45	36	64	36

The first 3 parameters dealing with stream cover and vegetation can be enhanced through planitng of woody vegetation, grasses and forbes along with careful coordination with the grazing management of the allotment. Decreases in ungulate overuse of riparian vegetation could come through changes in livestock management. New systems may have to be implemented and methods such as salting, water developement and shade developement away from the stream need to be explored. In areas deemed to be of great importance and/or of high sensativity, fencing may be the preferred way to protect the stream. Fencing options could include a special management pature with a reduces or modified grazing system, total exclusion or something in between.

The two parameters dealing with bankrock content and size would be difficult to manipulate. These are indicators of potential for instability rather than of habitat condition.

To increase bank stability, livestock grazing impacts may need to be reduced, vegetation could be planted, and in severe areas, cribbing and riprap may be needed.

The problem of high amounts of fines in the substrate can be attacked onsight and offsight. Sediment quite often originates in offsite areas and is transmittted to the stream in overland flow and through ephemeral and intermittant streams. Unstable stream banks can be principle contributors of sediment onsight. The biggest deterrent to sediment in overland flow from reaching the stream is a lush, stable riparian zone. Large quantities of silt can be filtered out in a stable health riparian zone. When poor conditions are present in a watershed, it may be beneficial to seed, fertilize and rest an area to increase ground cover and stability and therefore decrease soil movement. Soil moving towards the stream in ephemeral and intermittant channels can be, in part, intercepted and settled out in sediment basins constructed in the channels. An increase in pools can be brought about through instream structures, boulder placement and to some extent by the natural healing in a drainage that has been secerely impacted. Increasing pool quality is a little bit more difficult than working with some other parameters. Possibilities could include planting of vegetation around an existing pool to increase

cover or to place an instream structure in such a way that it would enhance an existing pool.

Action Plan

To this point the problems in the Big Lost River Drainage have been discussed and methods to correct them have been looked at. The next phase is to look at what area should be worked on first. Two main things should be looked at when deciding which streams should have priority, these are habitat condition and importance of the fishery to the public. The first we have a handle on with the survey data collected, while the second is more an educated guess using observations that have been made, along with some information from the survey crews.

Table 2 shows a priority breakdown based on stream habitat condition and recreation use. Looking at Table 2, it can be seen that the East Fork of the of the Big Lost River rates out as the highest priority stream to work on. The East Fork would be followed by the West Fork, Wild Horse Creek, Summit Creek, the North Fork, Coyote Creek, Kane Creek and Fox Creek. The rest of the streams would be lower priority due to better conditions and low use levels by recreationists.

The procedure to use in rehabilitating a stream after its deemed a problem exists, would be to go back to the field and identify types of projects that could be innitiated and places where they can be done. When this is completed, project work plans (1904's) can be written to identify materials, personnel, and funding needed to accomplish the project.

This final procedure should be done jointly with District representatives and a Fishery Biologist. There may be times, depending on projects being looked at, that an I.D. team review may be necessary.

TABLE 2 The table below compares habitat condition and recreation importance to come up with a priority system to help decide which streams should be worked on first.

STREAM	Habitat * Priority (1-5)	Recreation Use Priority (1-5) *	Priority Rating +
North Fork Big Lost River	3	3	6
Summit Creek	3	5	7
Kane Creek	3	3	6
Phi Kappa Creek	2	1	3
East Fork Big Lost River	4	5	9
Wild Horse Creek	4	4	8
Fall Creek	2	2	4
Big Boone Creek	3	1	4
Fox Creek	4	1	5
West Fork Big Lost River	4	4	8
Bellas Gulch	3	1	4
Broad Canyon	2	2	4
Muldoon Canyon	2	1	3
Star Hope Creek	2	2	4
Little Lake Cr.	3	1	4
Corral Creek	3	1	4
Coyote Creek	4	1	5
Cabin Creek	3	1	4

* Five is highest priority for work
+ Ten is highest priority for work

APPENDIX

Appendix B - Ratings for establishing habitat and recreation priorities

1 - Habitat - % Habitat Items Marked

	Rating
0 - 9	1
18 - 27	2
35 - 45	3
56 - 64	4
73 - 100	5

2 - Recreation - Use

	Rating
Light	1
Light to Moderate	2
Moderate	3
Moderate to Heavy	4
Heavy	5

Appendix A - Below is a listing of key parameters surveyed along with a description of when a problem in habitat condition is indicated.

1 - Stream Cover - When more than 75% of the water surface is exposed to direct sunlight for extended periods durin the day.

2 - Vegetative Bank Cover - When less than 75% of bank area is covered with vegetation.

3 - Dominant Vegetative Type - When bank cover is primarily grass or predominatly large trees with little understory.

4 - Bank Rock Content - When less than 50%.

5 - Bank Rock Size - When average size is less than 6" in diameter.

6 - Ungulate Use - When banks show greater than 30% damage by ungulates.

7 - Bank Stability - When bank stability drops below 70%.

8 - Bank Cutting - When bank cutting lengths exceed stream width.

9 - Deposition of fines - When fines in the sqawinig gravel exceed 25% (Fines ¼")

10 - Pool - Riffle Ratio - When less than 15% of the stream is pools.

11 - Pool Quality - When class 3 or higher rated pools make up less than 25% of pool area.

6 - Ungulate Use

a. Moderate to heavy ungulate use on a streambank reduces streamcover, and vegetative bank cover, increases unstable conditions which increases sediment deposits in streams, all of which reduce the streams' capacity to produce fish.

7 - Bank Stability

a. Bank Stability relates back to most of the items listed above. As instability increases both stream cover cover and vegetative bank cover are usually reduced, while bank cutting and sloughing, and deposition of fines increase.

8 - Bank Cutting

a. Bank cutting in small amounts is not necessarily a significant impact if it does not exceed stream widths in length. When it does it has the effects listed under bank stability above.

9 - Deposition of Fines (<¼" in Diameter)

a. High percentages of fines less than ¼ inch in diameter can affect several aquatic habitat features. The two main impacts are usually on spawning success and food production (Aquatic Insects). The attached graph (Figure 1) gives a good overview of how silt effects spawning success. The production of food organisms in a stream usually changes by a reduction in numbers and species as silt increases. Other effects are filling in of pools and slower water areas which reduces available fish rearing capacity, spawning riffles become embedded and make it difficult for smaller fish (<20") to spawn, and if prolonged periods of turbid water

APPENDIX C - Below is a discussion of the 11 parameters used to evaluate stream habitat condition.

1 - Stream Cover

a. Stream cover is important in many ways to a fish population. It is important as hiding cover, food production and temperature moderation. Cover is provided by vegetation (trees, bushes, grass), boulders, logs and debris, undercut banks and turbulance.

2 - Vegetative Bank Cover

a. The absence of bank cover can effect all the items in "1" above as well as make a streambank much more susceptable to erosion (cutting & sloughing), than if vegetation were present. Bank cover also is important in intercepting overland sediment flow before it reaches the stream.

3 - Dominant Vegetative Types

a. Probably the most advantageous vegetation condition on a streambank would be a good mix of grasses and forbes, shrubs and brush and larger trees. Vegetation should provide much of the conditions discussed in 1 & 2 above.

4 - Bank Rock Content

a. Streambanks made up primarily of soil with low rock content are highly susceptible to erosion if disturbed.

5 - Bank Rock Size

a. When bank rock size is small (<6" in diameter) it more easily loses its' abilit to hold a bank together when it becomes disturbed.

are present it reduces primary productivity in the stream by reducing the amount of light reaching the stream bottom.

10 - Pool: Riffle Ratio

a. Pool habitat is important for rearing, hiding cover, spawning, overwintering and survival during low flows.

b. Riffle areas are important for spawning and food production.

A 50:50 ratio of pools to riffle is generally accepted as an optimum condition with anything below 15:85 being considered too low to support a good fish population.

Generally speaking each good spawning riffle is tied to a pool. Therefore as pool: riffle ratio varies from 50:50 the potential for production decreases.

11 - Pool Quality

a. The quality of pools found in a stream has great influence over the numbers and size of fish present. A stream with numerous large, deep pools with abundant cover will support more and larger fish than a stream with predominantly small shallow pools with a scarcity of cover.